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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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Sumio Iijima

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7590

04/15/2009

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EXAMINER

KELLY, ROBERT M

ART UNIT

PAPER NUMBER

1633

MAIL DATE

DELIVERY MODE

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PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

<b>Office Action Summary</b>	<b>Application No.</b> 10/521,575	<b>Applicant(s)</b> IIJIMA ET AL.	
	<b>Examiner</b> ROBERT M. KELLY	<b>Art Unit</b> 1633	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 17 December 2008.
- 2a) ☒ This action is **FINAL**.                      2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-5 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-5 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |  |   |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)                       | 4) <input type="checkbox"/> Interview Summary (PTO-413)           |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)   | Paper No(s)/Mail Date. _____                                      |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date <u>7/9/08</u> .  | 6) <input type="checkbox"/> Other: _____                          |

### **DETAILED ACTION**

Applicant's argument and response of 12/17/08 are entered.

Claims 1-5 are amended.

Claim 6 is cancelled.

Claims 1-5 are presently pending and considered.

#### ***Claim Status, Cancelled Claim(s)***

In light of the cancellation of Claim 6, all rejections and/or objections to such claim are rendered moot, and thus, are withdrawn.

#### ***Claim Rejections - 35 USC § 102***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.

To maintain clarity of record, it is noted that all rejections of the claims under 35 U.S.C. 102(a) as being anticipated by Yudasaka, et al. (2003) Chemical Physics Letters, 374(1-2): 132-36, are rendered moot, as Applicant has perfected their priority.

#### ***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

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(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

To maintain clarity of record, it is noted that all rejections of the claims under 35 U.S.C. 103(a) as being unpatentable over Yudasaka, et al. (2003) Chemical Physics Letters, 374(1-2): 132-36, are rendered moot, as Applicant has perfected their priority.

### ***Claim Rejections - 35 USC § 112***

The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

In light of Applicant's amendment of the claims that limit the invention to the lysing of single-walled carbon nanotubes only, the rejections of Claims 1-5 under 35 U.S.C. 112, first paragraph, because the specification, while being enabling for methods of selectively lysing single-walled carbon nanotubes in solution, does not reasonably provide enablement for lysing multi-walled nanotubes, are rendered moot, and thus, are withdrawn.

### **Ajayan-Based Rejections**

### ***Claim Rejections - 35 USC § 102***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.

Claims 1, 2, and 4 remain rejected under 35 U.S.C. 102(a) as being anticipated by Ajayan, et al. (26 April 2002) Science, 296(5568): 705, for reasons of record.

Ajayan teaches the use of multiple single-wavelengths of light to flash-ignite compositions comprising many different nanotubes in experiments carried out at room temperature with oxygen in the atmosphere (Article in general). Such yields specific nanotube structures left over (e.g., FIGURES).

Hence, Ajayan teaches claimed embodiments.

It should be noted for the record that the claims also remain rejected, even after the amendment of 12/17/08, because Ajayan demonstrates the presence of SWNTs before and after exposure to light and oxidation (Figures C and D), and hence, absent reason to believe otherwise, at least one of the SWNTs was selected.

***Response to Argument – Anticipation: Ajayan***

Applicant's argument of 12/17/08 has been fully considered but is not found persuasive.

Applicant argues that the invention is to the use of a single wavelength, which is not used by Ajayan (i.e., Ajayan uses multiple wavelengths with a continuous spectrum), and that this is not disclosed or suggested in the prior art (p. 5, paragraphs 2-4).

Such is not persuasive. First, the claims are rejected, not specification's disclosure. Second, the claims do not exclude multiple wavelengths, or continuous spectrums, as further evidenced by depending claim 4. Applicant may claim a single wavelength, but, given its broadest interpretation, a broad spectrum is composed of single, individual wavelengths. Third, Ajayan's compositions contain single walled carbon nanotubes, so how can it be argued they were not selected out by lysis of others? Fourth, and lastly, it is not clear that a continuous

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spectrum is present, as such spectrum would depend on the specific flash characteristics of the flash used by Ajayan, which depends on what materials are used to generate the flash. Hence, Applicant's argument, even if it were directed to the claims, is ineffective.

Applicant argues that the white flash will inhibit the precise and intentional selection of single-walled carbon nanotubes as in the present invention (pp. 5-6, paragraph bridging-p. 6, paragraph 2).

Such is not persuasive. Applicant again does not even exclude multiple wavelengths or white light. Also, if an Artisan wished to obtain the same structures obtained by Ajayan, they would provide the same light and obtain the intentional and precise selection of the same structures. Moreover, to argue that the Artisan does not understand the quantum nature of light and its oxidation would be incorrect. The Examiner provides official notice at this point that even in 1990, the Examiner himself performed photolysis experiments on hemoglobins to produce specific lysing of species of bound molecules, and utilized filters to remove light wavelengths which would lyse other bound molecules, to thereby obtain the selective photolysis of specific bound molecules. Simply put, the quantum nature of light absorption is well known, as well as the oxidation of excited molecules, and their combination is even demonstrated in the arts cited in these various rejections. Hence, Applicant's own argument, even if the claims were only to single wavelengths, would not provide an advancement to the Art, which is the whole reason patents are provided.

***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1, 2, 3, and 4 remain rejected under 35 U.S.C. 103(a) as being unpatentable over Ajayan, et al. (26 April 2002) Science, 296(5568): 705 and Huang, et al. (February 2002) Chemosphere, 46(6): 815-825, e.g., ABSTRACT, for reasons of record.

Ajayan, as shown above, teaches various embodiments of the claimed invention, and therefore, also makes those same embodiments obvious. However, Ajayan does not teach the use of potassium permanganate.

On the other hand, the Artisan is well aware that potassium permanganate is an oxidizing agent, and that such could be utilized instead of oxygen as the oxidizing agent to flash-burn these same nanotubes. For example, Huang teaches the use of potassium permanganate in similar redox reactions (e.g., ABSTRACT).

Hence, because of the similar function of potassium permanganate in chemical reactions (general oxidizing agent), it would have been obvious to replace the use of oxygen with potassium permanganate. The Artisan would have had a reasonable expectation of success, as potassium permanganate was well known to have such similar function.

***Response to Argument – Ajayan/Huang***

Applicant's argument of 12/17/08 has been fully considered but is not found persuasive.

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Applicant argues that Huang is directed to oxidation of other compounds than single-walled nanotubes, and therefore it does not apply to single-walled nanotubes (p. 6, paragraph 3).

Such is not persuasive. Huang is properly applied and does apply, as it is not required to be directly demonstrated for single-walled nanotubes. The aspects of Huang apply to all light-excited compounds and their oxidation. Applicant should consider reading *KSR v. Teleflex* for guidance on this issue.

### **Braidy-Based Rejections**

#### ***Claim Rejections - 35 USC § 102***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.

In light of the amendments, the rejections of Claims 1, 2, 4 and 4 under 35 U.S.C. 102(a) as being anticipated by Braidy, et al. (November 2002) Nano Letters, 2(11): 1277-80, are withdrawn.

To wit, Braidy is concerned with nanotube bundles.

#### ***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person



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having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

In light of the amendments, the rejections of Claims 1-5 under 35 U.S.C. 103(a) as being unpatentable over Braidy, et al. (November 2002) Nano Letters, 2(11): 1277-80 and Huang, et al. (February 2002) Chemosphere, 46(6): 815-825, are withdrawn.

To wit, Braidy is concerned with nanotube bundles.

### **General Art-Based Rejections**

#### ***Claim Rejections - 35 USC § 103***

Claims 1-5 remain rejected under 35 U.S.C. 103(a) as being unpatentable over Kataura, et al. (1999) Synthetic Metals, 103: 255-88, Wintmere, et al. (1995) Carbon, 33(7): 893-902, U.S. Patent No. 5,294,315 to Cooper, U.S. Patent No. 5,116,582 to Cooper, U.S. Patent No. 5,174,877 to Cooper, and Huang, et al. (February 2002) Chemosphere, 46(6): 815-25, for reasons of record.

Kataura teaches that SWNTs in solution have distinct absorption peaks, correlating to their diameters (e.g., ABSTRACT). Further, such specific band-gap differences are to be expected as shown by Wintmire (e.g., ABSTRACT and SUMMARY).

It is well known that such band-gaps can be utilized to excite electrons into less stable states, and in fact that is what occurs during the absorption of light, as seen in Kataura.

Hence, given this, the Artisan at the time of invention recognized that specific SWNTs could be targeted by the utilization of single-wavelength light to excite electrons into more unstable states.

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In fact the Artisan recognized that such absorption could be utilized to completely release electrons from a molecule and may be utilized to cause photolysis of those molecules with that band-gap energy (e.g., U.S. Patent No. 5,294,315 to Cooper, et al., BACKGROUND, paragraph 4; U.S. Patent No. 5,116,582 to Cooper, et al., DESCRIPTION OF THE PRIOR ART, paragraph 1). Still further, the use of any oxidizing agent is readily apparent to the Artisan, including the use of hydrogen peroxide (e.g., U.S. Patent No. 5,174,877 to Cooper, et al., DESCRIPTION OF THE PRIOR ART, paragraph 5, teaching the general use of any oxidizer; and Huang, et al. (February 2002) Chemosphere, 46(6): 815-825, e.g., ABSTRACT, teaching the use of potassium permanganate).

Hence, at the time of invention, it would have been obvious to utilize the well-known band-gap energy differences to excite electrons in specific SWNTs in solution and do to yield selective degradation of those SWNTs which are not desired. Moreover, the Artisan would be motivated to do so either exposure to all the wavelengths except those desired, either serially or at one single time, to yield only those SWNTs desired, as each method would be instantly recognized to suffice. Finally, the Artisan would expect success, as the band-gap energies were known to differ, the methods of photolysis were known, and the use of potassium permanganate in redox reactions was well known.

***Response to Argument – Obvious over general Art***

Applicant's argument of 12/17/08 has been considered but is not persuasive.

Applicant argues there are special properties to SWNTs, arguing "the behavior and efficiency of photolysis with photo-oxidation will largely depend on the particular types of

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compounds used, and hence, standard quantum theory, without experiment and reduction to practice does not make obvious the invention (pp. 6-7, paragraph bridging).

Such is not persuasive. Hand-waving and broad attorney argument does not supplant the need to provide specific data and/or logic demonstrating that the Examiner's rejections are incorrect in their logic or data. Simply put, however, the quantum nature of light absorption is so well known and accepted in the art that the Artisan would find no reason to question the Examiner's argument. If molecules broke the quantum nature of absorption excitation and subsequent increased instability allowing oxidation, it would shake the very foundations of quantum light theory, and surely the Examiner would be well aware of this. However, the Examiner is not, and searching the Art has found no reason to believe this well known theory does not work.

### ***Conclusion***

No claim is allowed.

**THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event,

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however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to ROBERT M. KELLY whose telephone number is (571)272-0729. The examiner can normally be reached on M-F, 9:00am-5:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Joseph Woitach can be reached on (571) 272-0739. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Robert M Kelly/  
Primary Examiner, Art Unit 1633